IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF PENNSYLVANIA

ELIZABETH A. STANTON, Personal Representative of JOSEPH H. SANTARLASCI, III, Deceased, and Administrator of the Estate of JOSEPH H. SANTARLASCI, III,	)	
Plaintiff,	)	
v.	)	**Civil Action No. 02 CV 4779**
LAFAYETTE COLLEGE, *et al.*,	)	
Defendants.	)	

ORDER

AND NOW this _____ day of _____, 2003, upon consideration of the Motion of Defendant Lafayette College to Overrule Objections and Compel Full and Complete Answers to Interrogatories Directed to Plaintiff (Second Set), and upon consideration of Plaintiff Elizabeth A. Stanton's Opposition thereto, it is hereby **ORDERED** and **DECREED** that the Motion shall be, and hereby is, **DENIED.**

BY THE COURT:

_____
J.

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF PENNSYLVANIA

ELIZABETH A. STANTON, Personal Representative of JOSEPH H. SANTARLASCI, III, Deceased, and Administrator of the Estate of JOSEPH H. SANTARLASCI, III,	)	
Plaintiff,	)	
v.	)	**Civil Action No. 02 CV 4779**
LAFAYETTE COLLEGE, *et al.*,	)	
Defendants.	)	

PLAINTIFF'S OPPOSITION TO DEFENDANT LAFAYETTE COLLEGE'S MOTION TO OVERRULE OBJECTIONS AND COMPEL FULL AND COMPLETE ANSWERS TO INTERROGATORIES DIRECTED TO PLAINTIFF (SECOND SET)

COMES NOW Plaintiff, Elizabeth A. Stanton, by and through her undersigned counsel, and respectfully Opposes Defendant Lafayette College's Motion to Overrule Objections and Compel Full and Complete Answers to Interrogatories Directed to Plaintiff (Second Set), and as grounds therefore, refers to the Memorandum of Points and Authorities attached hereto and made a part hereof.

Respectfully submitted,

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IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF PENNSYLVANIA

ELIZABETH A. STANTON, Personal Representative of JOSEPH H. SANTARLASCI, III, Deceased, and Administrator of the Estate of JOSEPH H. SANTARLASCI, III,	)	
Plaintiff,	)	
v.	)	**Civil Action No. 02 CV 4779**
LAFAYETTE COLLEGE, *et al.*,	)	
Defendants.	)	

MEMORANDUM OF LAW IN SUPPORT OF PLAINTIFF'S OPPOSITION TO DEFENDANT LAFAYETTE COLLEGE'S MOTION TO OVERRULE OBJECTIONS AND COMPEL FULL AND COMPLETE ANSWERS TO INTERROGATORIES DIRECTED TO PLAINTIFF (SECOND SET)

Plaintiff Elizabeth A. Stanton hereby opposes Defendants Lafayette College's Motion to Overrule Objections and Compel Full and Complete Answers to Interrogatories Directed to Plaintiff (Second Set) ("Motion") and moves this Court for an Order denying the Motion, and as grounds therefor states as follows:

1. In its Motion, Defendant Lafayette College essentially asks this Court to require Plaintiff to provide information that, respectively, is beyond the scope of Fed. R. Civ. P. 26(a)(2)(B) (regarding the requirements of written reports prepared by experts engaged by Plaintiff in this case), or would require a mathematical computation of damages specifically held by the United States Supreme Court to be unnecessary. For these reasons, as more fully argued below, this Court should deny Lafayette College's

motion in its entirety. Alternatively, should this Court order Plaintiff to supplement the report of Jerome H. Modell, M.D., as demanded by Lafayette College, Plaintiff respectfully requests that such order also require Lafayette College to pay any expert fees incurred by Plaintiff as a result; and should this Court require the computation of damages demanded by Lafayette College, Plaintiff respectfully requests that she be allowed to provide said information through an additional expert report not due prior to the date in the Pre-Trial Order agreed to by the parties for the disclosure of all of Plaintiff's experts and expert reports.

Interrogatory 2

2. On or about November 12, 2002, Plaintiff timely served her Initial Disclosures pursuant to Fed. R. Civ. P. 26(a). Within those disclosures, Plaintiff identified, *inter alia*, Jerome H. Modell, M.D. ("Dr. Modell"), as an expert. Approximately two months later, Plaintiff provided to Lafayette College an expert report prepared by Dr. Modell. Pursuant to Fed. R. Civ. P. 26(a)(2)(B), Dr. Modell's report contained "a complete statement of all opinions to be expressed and the basis and reasons therefor; the data or other information considered by the witness in forming the opinions; any exhibits to be used as a summary of or support for the opinions; the qualifications of the witness, including a list of all publications authored by the witness within the preceding ten years; the compensation to the be paid for the study and testimony; and a listing of any other cases in which the witness has testified as an expert at trial or by deposition within the preceding four years." The purpose of this provision is to provide sufficient information about the expert and his or her opinions "so as to avoid unfair surprise to the opposing party and to conserve resources." 6 James Wm. Moore et al.,

Moore's Federal Practice § 26.23[2][b][ii] (3d ed. 1999). Dr. Modell's report includes all the required information, and is sufficiently detailed to "avoid unfair surprise to the opposing party."

3. In addition to the report, Plaintiff provided to Lafayette College, on January 2, 2003, a copy of a chapter of one of the foremost texts on drowning, which chapter, authored by Dr. Modell, describes, in detail, the pathophysiology of drowning. A copy of this chapter is attached hereto as Exhibit 1 for the Court's ease of reference.

4. On or about January 22, 2003 (before answering Plaintiff's Interrogatories, which had been served on it on December 16, 2002, and while claiming that it had not done so because its counsel were devoting their time to preparing for mediation), Lafayette College served on Plaintiff a second set of Interrogatories. In these, Lafayette College asked Plaintiff, a lay person, to provide the basis for some of the conclusions reached by Dr. Modell in his expert report. *See* Defendant Lafayette College's Interrogatories to Plaintiff (Second Set) ("Second Interrogatories") at ¶ 2. Plaintiff is not competent to provide said information, and certainly cannot provide such information "under oath," as is required by the Federal Rules. This information should be sought from Dr. Modell. Importantly, however, since learning of Dr. Modell's identity in November 2002, and since receiving his expert report in January 2003, Lafayette College has taken no steps to depose him. Instead, Lafayette College here improperly attempts to force Plaintiff to expend additional funds securing information readily available to Lafayette College. *Cf. Rogal v. American Broadcasting Companies, Inc.*, 1992 WL 210287, *1 (E.D. Pa.) ("If discovery by interrogatories is insufficient for the

preparation of cross-examination, the court may require further discovery including the taking of depositions").

5. Subsequent to receiving Plaintiff's objections to the Second Interrogatories, Defendant Lafayette College tried to recharacterize the information the Interrogatories, on their face, actually seek; indeed, the College now claims that what it actually wants is the identification of the publications on which Dr. Modell relied. *See* Second Interrogatories at ¶ 2; *compare* Motion at ¶ 27. Either way, however, the Interrogatory is improper. *See, e.g., Sig Swiss Industrial Co. v. Fres-Co System, USA, Inc.*, 1993 WL 147241, *5 (E.D. Pa.) ("Plaintiff is not entitled to copies of publications of expert witnesses, materials the witness has received in preparation, or materials the witness has given to defendant or his counsel"); *Williams v. McNamara*, 118 F.R.D. 294, 296 (D. Mass. 1988) (emphasis added) ("[A]sking for a 'summary of the grounds of each opinion' does not call for a recitation of documents which the expert reviewed in connection with his testimony; rather, the term refers to the reasons or rationale behind the opinions"). For these reasons, the Motion should be denied as to the objections properly asserted by Plaintiff with regard to Interrogatory 2, and of all its subparts.

6. Alternatively, if Plaintiff's objection is overruled, Lafayette College should be required to pay any expenses incurred by Plaintiff as a result.

Interrogatory 1

7. In addition to seeking improper expert testimony from Plaintiff, Lafayette College also asked Plaintiff to identify each person she contends is entitled to damages pursuant to Pennsylvania's wrongful death statute, codified at 42 Pa. Cons. Stat. § 8301 (2002), which Plaintiff did, and to state, "with respect to each such person identified, the

amount of damages claimed and the basis therefor." Second Interrogatories at ¶ 1. Lafayette College also asked that Plaintiff identify "any documents . . . which support, relate or refer to the claimed damages or the basis therefor."

8. In its Motion, Lafayette states that what it is seeking by way of this Interrogatory is a "computation" of damages suffered by the statutory beneficiaries in this case. Motion at 3.

9. Pennsylvania's wrongful death statute provides that the statutory beneficiaries (who have been identified by Plaintiff), are entitled "to recover, in addition to other damages, damages for reasonable hospital, nursing, medical, funeral expenses and expenses of administration necessitated by reason of injuries causing death." 42 Pa. Cons. Stat. Ann. § 8301 (West 2002). On January 23, 2003, Plaintiff provided to Lafayette College documents detailing, *inter alia*, the expenses incurred by the statutory beneficiaries for the funeral and interment of Joseph H. Santarlasci, III ("Jay"), as well as the "expenses of administration necessitated" by his wrongful death. *See* Fed. R. Civ. P. 33(d) (permitting, in lieu of an answer to an interrogatory, the provision of business records).

10. In addition to these damages, Plaintiff seeks damages for the loss to the statutory beneficiaries of Jay's services – including the "solace, society and companionship, as well as [his] comfort, guidance, kindly offices and advice" he would have provided had he not wrongfully died from drowning at Lafayette College. *See* Complaint at ¶¶ 87, 106, 130, 142 and 154. Pennsylvania law permits awards of pecuniary damages incurred by the statutory beneficiaries as a result of such losses. *See* Plaintiff's Opposition to Defendants' Motion for Partial Summary Judgment, filed herein;

see generally Sea-Land Service, Inc. v. Gaudet, 414 U.S. 573, 587 n.21 (1974) ("the wrongful-death statutes of . . . Pennsylvania . . . which either expressly or by judicial construction limit recovery to pecuniary losses have been judicially interpreted, nevertheless, to permit recovery for the pecuniary value of the decedent's society"). Such damages are properly "'left to turn mainly upon the good sense and deliberate judgment of the tribunal assigned by law to ascertain what is a just compensation for the injuries inflicted.'" *Sea-Land Service, Inc.*, 414 U.S. at 590. Thus:

> As in all damages awards for tortious injury, '(i)nsistence on mathematical precision would be illusory and the judge or juror must be allowed a fair latitude to make reasonable approximations guided by judgment and practical experience.'

Id. (*quoting Whitaker v. Blidberg Rothchild Co.*, 296 F.2d 554, 555 (4th Cir. 1961)) (interpreting Death on High Seas Act, which is substantively similar to Pennsylvania's wrongful death act). As a result, is not required to provide a "calculation" of damages claimed for the intangible losses suffered by the decedent's statutory beneficiaries as a result of Jay's wrongful death. This decision is properly for the jury. *See, e.g., Schofield v, Piper Aircraft Corp.*, 1988 WL 62181, *1 (E.D. Pa.) (citation omitted) ("[I]ntangible damages are problematical [and] the attempt to equate money with the loss in [a wrongful death] case is 'truly an impossible task'"). Lafayette College's Motion to Overrule Plaintiff's Objection to this Interrogatory therefore should be denied, and the issue should be allowed to follow its normal course of being presented to a jury.

11. Alternatively, if what Lafayette College is <u>in fact</u> seeking (the language of its Motion notwithstanding) is a recitation of the factual predicates on which Plaintiff's claims for the loss of Jay Santarlasci's services to his statutory beneficiaries are based (including the loss of his "solace, society and companionship, as well as comfort,

guidance, kindly offices and advice"), then Plaintiff respectfully requests that the Court clarify same, and grant her additional time to attempt to provide this information. Plaintiff notes, however, that Defendants have already pursued and completed the depositions of both Plaintiff and one of the statutory beneficiaries, the decedent's father, Joseph H. Santarlasci, Jr.. Further Defendants have already noticed the other statutory beneficiary's (Patricia A. Sanders) deposition for March 31, 2003, and Plaintiff assumes that a proper subpoena has been issued and served.

12. Finally, should the Court determine it necessary, Plaintiff specifically reserves the right to provide an expert report "calculating" (where and if possible) the amount of damages to which the statutory beneficiaries are entitled for their loss of Jay Santarlasci's services -- including the loss of his "solace, society and companionship, as well as comfort, guidance, kindly offices and advice." *D'Angelo v. United States*, 456 F. Supp. 127, 131-32 (D. Del 1978). Pursuant to the Scheduling Order in this case, Plaintiff's expert disclosures are not due until April 10, 2003.

CONCLUSION

WHEREFORE, for all these reasons, and for good cause shown, Plaintiff respectfully requests that this Court enter an Order denying, in its entirety, Defendant Lafayette College's Motion to Overrule Objections. Alternatively, Plaintiff respectfully requests, if the Court determines that additional information is required from Plaintiff's expert, Jerome H. Modell, M.D., that Lafayette College be required to pay all costs and expenses incurred by Plaintiff as a result; and, further, respectfully requests, if the Court determines that she must supply either a recitation of facts, that she be given additional time to attempt to do so, and that if the Court determines she must provide a "calculation" of damages for the statutory beneficiaries' loss of Jay Santarlasci's services, that she be given until the date by which expert disclosures are required to be made pursuant to the Pre-Trial Order in this case, in which to provide an expert report on these damages.

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that on this 24th day March, 2003, I caused to be delivered by facsimile and by United States mail, first-class postage prepaid, the foregoing Opposition and accompanying Memorandum of Points and Authorities to:

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EXHIBIT "1"

DROWNING

New Perspectives on Intervention and Prevention

Edited by

John R. Fletemeyer
Samuel J. Freas

Library of Congress Cataloging-in-Publication Data

Catalog record is available from the Library of Congress.

International Standard Book Number 1-57444-223-6
Printed in the United States of America 1 2 3 4 5 6 7 8 9 0
Printed on acid-free paper

2 Etiology and Treatment of Drowning

Jerome H. Modell

A treatise, published in Scandinavia in 1796, describes a method for resuscitating drowned persons by placing the tip of a hand-operated bellows into the patient's mouth and then squeezing the bellows rhythmically.[1] If the victim did not respond appropriately, pushing on the middle of the victim's chest was recommended. This maneuver, supposedly, is to expel air from the chest, and the purpose of the bellows is to inflate the chest. This method, crude as it may sound, is similar in principle to the mouth-to-mouth ventilation and closed-chest cardiac massage described in 1960 by Kouwenhoven, Jude, and Knickerbocker.[2] Between the publications of these two methods other techniques were advocated, including blowing smoke into the rectum of the victim to stimulate breathing,[1] rolling the victim over a barrel in a rocking motion, and the external chest compression method of artificial respiration.

Among the many descriptions of what occurs when a person drowns is Lowson's account. Lowson, a physician, survived a shipwreck in 1892, and later published his very vivid description of awakening underwater with a crushing, burning sensation in his chest, and swallowing what he thought were large amounts of water in order to avoid the urge to breathe while submerged.[3] After losing consciousness, Lowson apparently surfaced, began breathing, and thus survived the episode. In 1933, Karpovich described what he believed to be the stages of drowning, based in part on his observations of animals.[4] Karpovich reported an immediate struggle for freedom, suspension of movement, exhalation of a little air, frequent swallowing, and then a violent physical attempt at freedom by the victim, using arms and legs to stay at the surface or remove himself from the water, during which time fear and panic are elicited. He then postulated that the victim suffers convulsions, exhalation of air and spasmodic inspiratory efforts, disappearance of reflexes, and death. The vocal cords, reflexly, go into laryngospasm to protect the airway from aspiration of water. Finally, after the victim loses consciousness, the laryngospasm relents, and the victim breathes water, prior to suffering cessation of respiration and cardiac activity.

In my experience treating and/or consulting on over 100 near-drowning cases, I have interviewed several persons at the scene of drowning accidents. Karpovich's description of events rarely applies. Observers more often report that they just observed the victims motionless underwater, observed them to jump or dive into

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the water never to resurface, or observed the victim hyperventilating and then swimming underwater only to become suddenly motionless and seem to be floating while submerged. There is, then, no "classic" description of a drowning or near-drowning episode. Some persons, indeed, do find themselves suddenly in an aqueous environment when they cannot swim and appear to panic or struggle in what is termed the "fight for survival." More often than not, however, the victim does not fit into this category. Some victims dive into shallow bodies of water and hit their heads on the bottom of the pool or some other hard object, suffer a concussion, lose consciousness, are unable to help themselves, and aspirate water. Others suffer severe injury to their cervical spinal cords, resulting in paralysis of their arms and legs. Others become disoriented while submerged in muddy or unclear water and swim in the wrong direction until they no longer can remain conscious. Still others hyperventilate, hold their breath, and then attempt to swim for long periods of time underwater. In this latter case, arterial carbon dioxide tension is decreased to very low levels, thus prolonging the interval from beginning of breath-holding until the irresistible urge to breathe.[5–8] Since there is no significant increase in arterial oxygenation during hyperventilation, the victims' ability to maintain an adequate amount of oxygen in the blood that can perfuse and oxygenate the brain is not prolonged commensurate with their breath-holding or ability to suppress the carbon dioxide-induced drive to breathe. These individuals then lose consciousness, after which they breathe underwater and aspirate water into their lungs, what many term the "hyperventilation syndrome" or "shallow water blackout."

A significant number of teenagers and adults show evidence of having ingested alcoholic beverages, which likely compromised their ability to perform swimming maneuvers in an effective manner.[9] Still others suffer a medical event, such as a seizure, syncope, or heart attack, and become submerged and then asphyxiate, unable to protect themselves in an aqueous environment. Finally, victims of foul play are found in the water, although they may have been unconscious or deceased prior to entering the water. A myriad of environmental situations may result in drownings or near-drownings.

The terminology surrounding this tragedy can also be confusing. By definition, "drowned" means the individual died secondary to being submerged in an aqueous environment.[10–11] It is possible to drown without aspiration, in which case water is not aspirated into the lungs. This can occur if the patient undergoes laryngospasm while submerged, and cardiac arrest occurs without the victim taking an intervening breath. Approximately 10% of drowned victims are thought to have drowned without aspiration.[12] The real incidence of drowning without aspiration actually may be lower since such a diagnosis can be confused with that of someone who suffers foul play and then enters the water or someone who suffers sudden cardiac death. The remaining victims are those who drown with aspiration, i.e., water actively enters the lungs. This occurs when the individual breathes while submerged. Although some have postulated that the lungs may become "filled" with water after death,[13] this is not compatible with autopsy findings in drowned victims where very little evidence of water may be seen in the lungs. I believe, therefore, that for water to enter the lungs

in more than insignificant quantities, active breathing must have occurred while the victim was submerged.

The term "near-drowning" refers to one who has survived, at least for a time, after a submersion episode.[10-11] Near-drowning can occur both with and without aspiration of water in approximately the same percentage as drowned victims for each category.

Animal studies of Swann and associates in the 1940s suggest that severe electrolyte changes occur during submersion and that those changes are directly related to the cause of death.[14-15] Experience in treating human near-drowning victims suggests that this is not the case; very few of those individuals demonstrate significant abnormalities in serum electrolyte concentration as measured in the emergency room of the hospital.[16] Subsequent studies suggest that the volume of water aspirated by humans is relatively small compared to the animals that Swann studied under conditions of total immersion. These studies have clearly demonstrated that the electrolyte changes that might occur with the aspiration of water are directly proportional to the amount of water aspirated.[17-18] Further, when we compared serum electrolyte changes after aspiration of water in an anesthetized animal model with those seen at autopsy in humans, 85% of human drowning victims aspirated only 22 ml/kg of water or less.[19] Thus, serum electrolyte changes are not an important factor in determining survival after submersion. Based on evaluations of serum electrolyte and blood gas analyses of near-drowned patients, the same statistics apply to them as well.

The foremost problems confronting both the drowned and the near-drowned victim are the consequences of hypoxemia and the resulting metabolic acidosis that occurs secondary to a submersion event. Through correlation of observations in humans and results obtained in anesthetized animal models, it is believed that, based on arterial oxygen levels, unless there are other complicating medical factors, it would be unusual for humans submerged for a minute or less not to survive spontaneously with normal cerebral function if they are removed from the water by that time. Likewise, in the event that they have suffered apnea, the prognosis is excellent if respiration is restored immediately. By three minutes of submersion, arterial oxygen tension falls to a level that is incompatible with the normal individual maintaining consciousness.[20] These individuals may also suffer respiratory and cardiac arrest. Prompt restoration of spontaneous ventilation and circulation using basic cardiopulmonary resuscitation usually results in survival if appropriate and definitive therapy is made available in a timely fashion. Those rescued after a submersion episode of three to five minutes are subject to a more severe degree of cerebral hypoxia. In these individuals, although cardiopulmonary resuscitation is often effective at re-establishing spontaneous ventilation and circulation, there is considerable likelihood that these individuals may suffer some type of permanent neurologic impairment. The incidence of such complications usually is directly related to the length of submersion.[21]

Recovery has been reported in persons submerged for from five to ten minutes; however, in this group, more likely than not, normal neurologic function will not return completely. With resuscitation after a submersion episode of at least

ten minutes, complete restoration of normal brain function is very uncommon unless the submersion episode has occurred in very cold water.

During submersion in very cold water, if the victim aspirates water or if a significant portion of the body surface area is in contact with the water, very rapid body cooling will occur and tolerance to hypoxia will be significantly prolonged.[22] Remember, it is not the temperature of the water alone, but the resulting temperature of the victim that is important in determining whether survival with normal brain function will occur after prolonged submersion in cold water because hypothermia decreases the requirement for oxygen. For every degree Centigrade that body temperature drops, there is approximately a 7–9% decrease in oxygen required. Thus, when profound, rapid cooling occurs, it protects the brain and other vital organs from hypoxic injury. Hypothermia is a double-edged sword, however, since, as the heart cools, it is more subject to fatal arrhythmias. Once a body temperature below 28°C occurs, for example, ventricular arrhythmia resulting in an inadequate cardiac output is quite common.

It should be obvious that normal survival should be expected if effective cardiopulmonary resuscitation is performed prior to the time the patient suffers irreversible neurologic hypoxic damage and if the patient has not aspirated water in amounts that alter lung function.

It is well known that drowning and near-drowning victims frequently experience apnea or cessation of respiration before they suffer cardiac arrest. They also frequently display a severe bradycardia, or slowed heartbeat, and peripheral vasoconstriction. Thus, if effective mouth-to-mouth ventilation is performed, the heart may become reoxygenated, pulse rate will increase, and there will be better tissue perfusion. In this situation, closed-chest cardiac massage is not necessary.

After freshwater aspiration, the water is absorbed very rapidly from the alveoli into the circulation because the water is hypotonic. However, the surface tension of pulmonary surfactant, which is a material lining the alveoli of the lungs, is significantly altered so that those alveoli are less likely to remain open upon exhalation.[23] Thus, there is a decrease in the ventilation-perfusion ratio or even atelectasis, which results in "shunting" of blood past alveoli that are poorly ventilated, or not ventilated, but perfused. Because these alveoli cannot effectively participate in gas exchange, the victim is unable to oxygenate his/her blood in those areas of the lung. This results in arterial hypoxemia, which may compromise the viability of the individual. After seawater aspiration, arterial hypoxemia also occurs secondary to intrapulmonary shunting, although the mechanism is different. Seawater, being hypertonic, draws fluid from the circulation into the lung, and results in fluid-filled but perfused alveoli, which are incapable of normal gas exchange.[17,24]

Understanding these physiologic changes in the lung is important so that the physician is able to apply the proper methods of intensive pulmonary care necessary to restore more normal pulmonary function. Such care includes the administration of oxygen, mechanical support of ventilation, and the application of positive pressure to the airway, either as positive end-expiratory pressure in persons who require mechanical ventilation, or as continuous positive airway pressure in persons who are permitted to breathe spontaneously for a portion of the respiratory cycle. Application of positive pressure to the airway is aimed at increasing functional

residual capacity, better matching ventilation-to-perfusion ratios,[24–26] decreasing the amount of intrapulmonary shunting, and, thus, improving arterial oxygenation. The exact pattern of mechanical ventilatory support and the duration it is required will be judged by the treating physician based on the patient's response to therapy. The patient should be able to oxygenate his or her blood and to eliminate the carbon dioxide.

Because of the fluid shifts that occur across the alveolar-capillary interface in the lung, persons who aspirate substantial amounts of freshwater will usually develop acute hypervolemia.[18] However, within an hour there is redistribution of fluid and pulmonary edema occurs, which results in a decreased circulating blood volume.[23] After seawater aspiration, because of the hypertonic effect of the seawater, pulmonary edema occurs rapidly, usually within three minutes, and results in decreased circulating blood volume.[17] For both freshwater- and seawater-aspiration patients, it may be necessary to intravenously replace substantial volumes of fluid, while the effective circulating blood volume and resulting cardiac output are monitored. Treating the lungs may result in good arterial oxygenation of blood, but, without adequate cardiac output, the blood cannot reach the peripheral tissues to provide them with nutrients.[28]

Even if the patient regains consciousness, this is not a guarantee that the patient will recover completely. Some patients suffer significant pulmonary infection or sufficient damage to the lung to cause adult respiratory distress syndrome (ARDS), which further complicates pulmonary therapy. Such individuals may die of pulmonary insufficiency, regardless of the level and type of therapy applied. At one time it was considered therapeutic to administer intravenous corticosteroids to decrease the inflammation caused by the aspirated liquid.[29] This has been shown to be ineffective,[30] however, and may result in an altered ability of the body to isolate areas of infection in the lung.[31] Hemolysis of red blood cells and changes in renal function have been reported but, at a clinically significant level, these are rare.[32]

Exactly how long a drowning or near-drowning victim has been submerged is hardly ever known. The degree of arterial hypoxemia and, therefore, the potential for brain damage and cardiac arrest, are directly proportional to the duration of time from the onset of submersion to the administration of effective resuscitative measures. Since ventilation usually stops before circulation, it is prudent to begin mouth-to-mouth ventilation as soon as possible, preferably in the water, if the rescuer is able to perform mouth-to-mouth ventilation without putting himself or herself at risk. If effective mouth-to-mouth ventilation is performed and the victim's heart is still beating, there will be improved oxygenation of the myocardium followed by an increase in cardiac output. If the victim has not aspirated water, a prompt, full recovery may be expected. If the victim has aspirated water, alteration of pulmonary function will undoubtedly occur and further therapy will be necessary. If the rescuer cannot feel a pulse, closed-chest cardiac massage, in addition to mouth-to-mouth ventilation, is imperative.

While some have advocated the use of the abdominal thrust, or Heimlich Maneuver, in the treatment of near-drowned victims,[13] I agree with the American Heart Association,[33] the American Red Cross, and the Institute of Medicine's[34] findings, namely, that basic cardiopulmonary resuscitation is the preferred therapy. I further

believe that the use of the Heimlich Maneuver may increase the interval before administration of effective CPR, thereby potentially increasing the duration of cerebral hypoxia. Furthermore, with an abdominal thrust maneuver, it is unlikely that a significant quantity of water will be expelled from the lungs. This is particularly true in freshwater near-drowning where the water is absorbed very rapidly from the lungs into the circulation. If water is expelled, it is more likely swallowed water from the stomach. Should the victim take a breath during the time the water is being expelled, he or she may aspirate this material, thus compounding pulmonary injury and complicating the aspiration of water with the aspiration of stomach contents, which, in general, produces a more severe lesion.[35]

Since the poolside observer frequently does not know whether or not aspiration has occurred, it is prudent that all near-drowning victims be transported by appropriate rescue vehicle to an emergency room facility, where a physician can examine the patient and perform laboratory tests, as needed, to evaluate the severity of the injury and the treatment indicated.

When emergency medical technicians arrive, it is important that they evaluate the patient to determine what type of further emergency therapy is necessary. I believe that all near-drowning victims should be given supplemental oxygen en route to the hospital since it is not possible for the initial responders to know with certainty the adequacy of the patient's arterial oxygenation. If the patient is awake and talking, that is a very positive sign; however, one does not know how close the patient may be to losing consciousness due to a slight further drop in arterial oxygen tension. If the patient is not able to maintain an airway, then that airway must be supported manually by the emergency medical technician; the need for an oropharyngeal airway or even endotracheal intubation should be evaluated. It should be remembered, however, that if the patient has active oropharyngeal reflexes, inserting an oropharyngeal airway may lead to laryngospasm or to vomiting with subsequent aspiration of stomach contents. Endotracheal intubation should be attempted only by those who are skilled in the technique and then the patient should be thoroughly evaluated to ensure that the endotracheal tube is properly placed in the trachea rather than in the esophagus or one of the mainstem bronchi. Demonstrating carbon dioxide on exhalation is highly desirable as a method of confirming tracheal placement of the tube. At a minimum, however, the laryngoscopist must listen over both sides of the patient's chest and the epigastrium to check for proper placement of the endotracheal tube.

Transmitting the patient's electrocardiogram via telemetry to the hospital is useful in helping the emergency medical technician to determine whether significant cardiac arrhythmias are present. Obviously, blood pressure should be measured and inotropic support administered, if indicated. In my experience, however, support of the circulation of the near-drowning victim with inotropic agents is usually not necessary if adequate oxygenation is achieved. An intravenous line should be started so that the emergency medical technician has access to the circulation should the administration of intravenous drugs be necessary. The patient should be monitored with pulse oximetry if the appropriate equipment is available in the rescue vehicle. For patients who are not adequately oxygenated as evidenced by pulse oximetry, the application of positive airway pressure may be used if the appropriate equipment

is available and the emergency medical technician is familiar with its use and potential complications.

Once the patient arrives at the hospital, arterial blood gas tensions and pH should be measured in order to ensure that there is adequate arterial oxygenation and carbon dioxide removal. The pH of the blood will indicate whether there remains a metabolic acidosis secondary to a significant period of hypoxia. Respiratory acidosis, if it exists, also will become evident. A metabolic acidosis resulting in a pH of less than 7.2 should be treated with sodium bicarbonate; however, a pH above 7.2 is probably best left to correct itself, provided the patient has adequate circulation and respiration either spontaneously or artificially.

Any question regarding the adequacy of the patient's effective circulating blood volume can be evaluated by a central venous catheter or preferably a pulmonary artery catheter, which will give the clinician the opportunity to evaluate pulmonary artery occlusion pressure and, thus, guide further fluid therapy. An echocardiogram may be useful for this purpose as well. Initial laboratory evaluation should consist of arterial blood gas measurements, a hemoglobin or hematocrit, plasma hemoglobin concentration, and serum electrolyte concentrations; urinalysis should also be performed. It is unlikely that a significant abnormality in any of the above tests, other than the blood gas results, will be seen unless the victim has aspirated a substantial quantity of water. This occurs in less than 15% of the population.[19] The magnitude of intensive respiratory support, cardiovascular support, and fluid administration required will depend on the individual patient and must be left to the judgment of the intensivist physician responsible for the patient's hospital care.

It is important to realize that there is no single clinical observation or laboratory test available at the scene of the accident that permits one to predict with certainty the outcome of the patient.[36] This becomes particularly difficult in the comatose patient because one does not want to withhold therapy from any patient who has a chance of normal survival. On the other hand, prolonged intensive therapy administered to the patient who has irreversible brain damage takes a significant toll on friends and relatives, in addition to being extremely costly. Perhaps the most reliable single indicator of whether the victim can regain normal brain function is appropriate response to evoked potential monitoring.[37] This technique, however, requires special equipment within the hospital and is not available either at the scene or in transit to the hospital. Knowing there is no single clinical observation or test that will accurately and uniformly predict survival or brain death,[36] near-drowned patients who are awake and alert when they arrive in the emergency room have been reported in two studies to have a 100% normal survival rate.[38–39] Occasionally, however, such an individual will die, usually from progressive pulmonary complications. Patients who have a blunted level of consciousness upon arrival at the emergency room have a survival rate of approximately 90%.[36] It is patients who are comatose upon arrival at the emergency room who are most likely to subsequently die or live with significant incapacitating brain damage. In this particular group of patients, the normal survival rate was in the 40–50% range, unless they were flaccid upon admission to the emergency room, or were still in a state of cardiac arrest, in which case the prognosis is very grim, with a survival rate of 7% at best.[35–39]

Although it is not the purpose of this chapter to discuss pool safety, I feel very strongly that pools should have a protective enclosure that minimizes the risk of someone inadvertently entering the water. I also firmly believe that young children should be taught to swim so that they can remove themselves from the water should they accidently fall in.

When someone in a pool is submerged, all too frequently bystanders and even some professional lifeguards assume the victim is not in distress but rather "horsing around." Whenever someone is submerged and not making purposeful movements it should be assumed that he or she is in serious trouble and that person should be removed from the water immediately.

Finally, I would like to condemn the teaching of hyperventilation prior to underwater swimming as a method by which one can prolong breath-holding, and thus increase time under water. This potentially lethal exercise should be avoided by prudent people.

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